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EXAMINER

MICHALSKI, JUSTIN I

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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2644

9

DATE MAILED: 11/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

TS

Office Action Summary

Application No.

10/074,604

Applicant(s)

FINCHAM, LAWRENCE R.

Examiner

Justin Michalski

Art Unit

2644

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 February 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-58 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 11-17, 20-29, 31-41, 43-53 and 56-58 is/are rejected.
- 7) ☒ Claim(s) 8-10, 18, 19, 30, 42, 54 and 55 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4 and 8. 6) ☐ Other: _____

Priority

1. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 119(e) as follows: Application was filed (2/11/2002) more than 12 months after provisional application 06/267,952 filed on 2/9/2001.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
3. Claim 40 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 40 recites the limitation "said bass-enhanced stereo difference signal" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-4, 12-14, 17, 23-26, 29, 34-37, 40, and 41 are rejected under 35 U.S.C. 102(b) as being anticipated by Cohen (US Patent 4,308,4230).

Regarding Claim 1, Cohen discloses a sound system (Figure 2), comprising: a left speaker (speaker 52) and a right speaker (speaker 54) located in close proximity; a left channel audio signal (reference 56); a right channel audio signal (reference 58); and a sound processor receiving as inputs said left channel audio signal and said right channel audio signal (Figure 3), said sound processor configured to cross-cancel a spectrally weighted stereo difference signal with said left channel audio signal and said right channel audio signal to said left speaker and said right speaker, respectively.

Regarding Claim 2, Cohen further discloses the sound processor (Figure 3) is configured to generate a difference signal representing a difference between said left channel audio signal and said right channel audio signal (subtractor 90), and to apply a spectral weighting to said difference signal (filters 92, 94, 98, variable gain 104, and splitter 112) thereby generating said spectrally weighted signal (output of 112 and 116).

Regarding Claim 3, Cohen further discloses, said sound processor comprises discriminator 90 which outputs the left input minus the right input (i.e. subtractor) (Column 5, lines 58-61).

Regarding Claim 4, Cohen further discloses low pass filter 94 (Figure 3) which inherently consists of a first region of level gain (i.e. pass band), a second filter region having a generally decreasing gain (i.e. transition band), and a third filter region of relatively level gain (i.e. rejection band).

Regarding Claim 12, Cohen further discloses the device using a clock of close to 3 MHz and a variable clock rate (i.e. digital) for producing delay (Column 2, lines 25-45).

Regarding Claim 13, Cohen discloses a system (Figure 2) for adaptive sound reproduction in a manner so as to enlarge the perceived area and stability of a stereo sound image, comprising: a left speaker (speaker 52) and a right speaker (speaker 54) located in close proximity; a left channel audio signal (reference 56); a right channel audio signal (reference 58); a subtractor (subtractor 90) receiving as inputs said left channel audio signal and right channel audio signal, and outputting a difference signal representing a difference between said left channel audio signal and said right channel audio signal; a spectral weighting filter receiving said difference signal as an input and outputting a spectrally weighted signal (filters 92, 94, 98, variable gain 104, and splitter 112); and a cross-cancellation circuit (mixer 114 and 116) for mixing said spectrally weighted signal with said left channel audio signal and said right channel audio signal, thereby generating a first speaker signal for said left speaker and a second speaker signal for said right speaker.

Regarding Claim 14, Cohen further discloses low pass filter 94 (Figure 3) which inherently consists of a first region of level gain (i.e. pass band), a second filter region having a generally decreasing gain (i.e. transition band), and a third filter region of relatively level gain (i.e. rejection band).

Regarding Claim 17, Cohen further discloses a phase equalizer (phase splitter 112) interposed between said spectral weighting filter (filter 98) and said cross-cancellation circuit (mixer 114).

Regarding Claim 23, Cohen further discloses the device using a clock of close to 3 MHz and a variable clock rate (i.e. digital) for producing delay (Column 2, lines 25-45).

Regarding Claim 24, Cohen discloses a method of sound reproduction, comprising the steps of: placing a left speaker (speaker 52) and a right speaker (speaker 54) in close proximity; receiving a left channel audio signal (reference 56); receiving a right channel audio signal (reference 58); generating a difference signal representing a difference between said left channel audio signal and said right channel audio signal (subtractor 90); applying a spectral weighting to said difference signal thereby generating a spectrally weighted signal (filters 92, 94, 98, and variable gain 104); and cross-canceling said spectrally weighted signal with said left channel audio signal and said right channel audio signal, thereby generating a first speaker signal for said left speaker and a second speaker signal for said right speaker (outputs of 112 and 116).

Regarding Claim 25, Cohen further discloses, said sound processor comprises discriminator 90 which outputs the left input minus the right input (i.e. subtractor) (Column 5, lines 58-61).

Regarding Claim 26, Cohen further discloses low pass filter 94 (Figure 3) which inherently consists of a first region of level gain (i.e. pass band), a second filter region having a generally decreasing gain (i.e. transition band), and a third filter region of relatively level gain (i.e. rejection band).

Regarding Claim 29, Cohen further discloses performing phase equalization (filters 92, 94, and 98) on said difference signal prior to said step of cross-canceling said spectrally weighted signal with said left channel audio signal and said right channel audio signal (mixers 114, and 116); and performing phase compensation on each of

said left channel audio signal and right channel audio signal (phase splitter 112) to compensate for the spectral weighting and phase equalization performed on said difference signal.

Regarding Claim 34, Cohen further discloses the device using a clock of close to 3 MHz and a variable clock rate (i.e. digital) for producing delay (Column 2, lines 25-45).

Regarding Claim 35, Cohen discloses a method for adaptively reproducing sound in a manner so as to enlarge the perceived area and stability of a stereo sound image, the method comprising the steps of: placing a left speaker (speaker 52) and a right speaker (speaker 54) in close proximity; receiving a left channel audio signal (reference 56); receiving a right channel audio signal (reference 56); and cross-canceling a spectrally weighted stereo difference signal (input to reference 112) with said left channel audio signal and said right channel audio signal (mixers 114 and 116) prior to applying said left channel audio signal and said right channel audio signal to said left speaker and said right speaker, respectively, said spectrally weighted difference signal derived from said left channel audio signal and said right channel audio signal (derived from output of subtractor 90).

Regarding Claim 36, Cohen further discloses said spectrally weighted difference signal (input to reference 112) is generated by obtaining a difference signal representing a difference between said left channel audio signal and said right channel audio signal (subtractor 90), and applying said difference signal to a spectral weighting filter (filters 92, 94, and 98).

Regarding Claim 37, Cohen further discloses low pass filter 94 (Figure 3) which inherently consists of a first region of level gain (i.e. pass band), a second filter region having a generally decreasing gain (i.e. transition band), and a third filter region of relatively level gain (i.e. rejection band).

Regarding Claim 40, Cohen further discloses the step of performing phase equalization (filters 92, 94, and 98) on an output of said spectral weighting filter prior to said step of cross-canceling difference signal with said left channel audio signal and said right channel audio signal (mixers 114, and 116).

Regarding Claim 41, Cohen further discloses the step of performing phase compensation on each of said left channel audio signal and right channel audio signal (phase splitter 112) to compensate for said step of performing phase equalization on said output of said spectral weighting filter.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen as applied to claim 1 above in view of Klayman (US Patent 5,661,808).

Regarding Claim 5, Cohen discloses a system as stated above apropos of claim 1 but does not disclose the spectral weighting filter with a roll-frequency of

approximately 200Hz. Klayman discloses a stereo enhancement system (Figure 1) comprising a low pass filter 44. Cohen further discloses perspective curve (Figure 2) which shows a decrease at frequencies above 125Hz (i.e. approximately 200Hz) (Column 5, lines 50-51) and states it is possible to use a band-rejection filter having a minimum gain at point B (Column 5, lines 61-63). Cohen teaches that boosting the level of difference between left and right signals can widen a perceived sound image. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a roll off frequency of approximately 200 Hz to boost low frequencies to widen a perceived sound image.

Regarding Claim 6, Cohen further discloses perspective curve (Figure 2) showing a minimum gain at point B of 2.1 KHz (i.e. approximately 2 KHz) (Column 5, lines 53-55).

7. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen as applied to claim 2 above in view of Cowieson et al. (US Patent 6,198,826). Cohen discloses a system as stated above apropos of claim 2 but does not disclose the processor comprising a linear filter. Cowieson et al. discloses a surround synthesis system utilizing linear filters (Column 5, lines 13-16). It would have also been obvious to one of ordinary skill in the art at the time the invention was made that a linear filter could have been used.

8. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen as applied to claim 1 above in view of Fosgate (US Patent 5,199,075). Cohen discloses

a sound system as stated in claim 1 but does not disclose being used in a surround left or right speaker comprising of a back left and right speaker. Fosgate discloses a surround system (Figure 1) comprising surround left speaker 14 and surround right speaker 15 which include back left speaker 14b and back right speaker 15b. Fosgate teaches that a system intended for surround sound tracks is intended to have loudspeakers having dipole radiation characteristics to diffuse sound effects the rear of the room (Column 2, lines 11-19). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include surround speakers with side and rear signals to diffuse sound effects to the back of the room for a higher fidelity signal.

9. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen as applied to claim 14 above in view of Klayman (US Patent 5,661,808).

Regarding Claim 15, Cohen discloses a system as stated above apropos of claim 14 but does not disclose the spectral weighting filter with a roll-frequency of approximately 200Hz. Klayman discloses a stereo enhancement system (Figure 1) comprising a low pass filter 44. Cohen further discloses perspective curve (Figure 2) which shows a decrease at frequencies above 125Hz (i.e. approximately 200Hz) (Column 5, lines 50-51) and states it is possible to use a band-rejection filter having a minimum gain at point B (Column 5, lines 61-63). Cohen teaches that boosting the level of difference between left and right signals can widen a perceived sound image. Therefore, it would have been obvious to one of ordinary skill in the art at the time the

invention was made to use a roll off frequency of approximately 200 Hz to boost low frequencies to widen a perceived sound image.

Regarding Claim 16, Cohen further discloses perspective curve (Figure 2) showing a minimum gain at point B of 2.1 KHz (i.e. approximately 2 KHz) (Column 5, lines 53-55).

10. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen as applied to claim 17 above in view of Cowieson et al. (US Patent 6,198,826). Cohen discloses a system as stated above apropos of claim 17 but does not disclose the phase equalizer comprising of a linear filter. Cowieson et al. discloses a surround synthesis system utilizing linear filters (Column 5, lines 13-16). It would have also been obvious to one of ordinary skill in the art at the time the invention was made that a linear filter could have been used.

11. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen as applied to claim 13 above in view of Cowieson et al. (US Patent 6,198,826). Cohen discloses a system as stated above apropos of claim 13 but does not disclose the spectral weighting filter comprising of a linear filter. Cowieson et al. discloses a surround synthesis system utilizing linear filters (Column 5, lines 13-16). It would have also been obvious to one of ordinary skill in the art at the time the invention was made that a linear filter could have been used.

12. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen as applied to claim 13 above in view of Fosgate (US Patent 5,199,075). Cohen discloses a sound system as stated in claim 13 but does not disclose being used in a surround left or right speaker comprising of a back left and right speaker. Fosgate discloses a surround system (Figure 1) comprising surround left speaker 14 and surround right speaker 15 which include back left speaker 14b and back right speaker 15b. Fosgate teaches that a system intended for surround sound tracks is intended to have loudspeakers having dipole radiation characteristics to diffuse sound effects the rear of the room (Column 2, lines 11-19). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include surround speakers with side and rear signals to diffuse sound effects to the back of the room for a higher fidelity signal.

13. Claims 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen as applied to claim 26 above in view of Klayman (US Patent 5,661,808).

Regarding Claim 27, Cohen discloses a system as stated above apropos of claim 26 but does not disclose the spectral weighting filter with a roll-frequency of approximately 200Hz. Klayman discloses a stereo enhancement system (Figure 1) comprising a low pass filter 44. Cohen further discloses perspective curve (Figure 2) which shows a decrease at frequencies above 125Hz (i.e. approximately 200Hz) (Column 5, lines 50-51) and states it is possible to use a band-rejection filter having a minimum gain at point B (Column 5, lines 61-63). Cohen teaches that boosting the level

of difference between left and right signals can widen a perceived sound image.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a roll off frequency of approximately 200 Hz to boost low frequencies to widen a perceived sound image.

Regarding Claim 28, Cohen further discloses perspective curve (Figure 2) showing a minimum gain at point B of 2.1 KHz (i.e. approximately 2 KHz) (Column 5, lines 53-55).

14. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen as applied to claim 29. Cohen discloses a method as stated above apropos of claim 29 but does not disclose the phase equalization using a second order filter. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made that a second order filter could be used.

15. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen as applied to claim 24 above in view of Cowieson et al. (US Patent 6,198,826). Cohen discloses a system as stated above apropos of claim 24 but does not disclose the spectral weighting filter comprising of a linear filter. Cowieson et al. discloses a surround synthesis system utilizing linear filters (Column 5, lines 13-16). It would have also been obvious to one of ordinary skill in the art at the time the invention was made that a linear filter could have been used.

16. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen as applied to claim 24 above in view of Fosgate (US Patent 5,199,075). Cohen discloses a sound system as stated in claim 24 but does not disclose being used in a surround left or right speaker comprising of a back left and right speaker. Fosgate discloses a surround system (Figure 1) comprising surround left speaker 14 and surround right speaker 15 which include back left speaker 14b and back right speaker 15b. Fosgate teaches that a system intended for surround sound tracks is intended to have loudspeakers having dipole radiation characteristics to diffuse sound effects the rear of the room (Column 2, lines 11-19). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include surround speakers with side and rear signals to diffuse sound effects to the back of the room for a higher fidelity signal.

17. Claims 38 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen as applied to claim 37 above in view of Klayman (US Patent 5,661,808).

Regarding Claim 38, Cohen discloses a system as stated above apropos of claim 37 but does not disclose the spectral weighting filter with a roll-frequency of approximately 200Hz. Klayman discloses a stereo enhancement system (Figure 1) comprising a low pass filter 44. Cohen further discloses perspective curve (Figure 2) which shows a decrease at frequencies above 125Hz (i.e. approximately 200Hz) (Column 5, lines 50-51) and states it is possible to use a band-rejection filter having a minimum gain at point B (Column 5, lines 61-63). Cohen teaches that boosting the level

of difference between left and right signals can widen a perceived sound image.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a roll off frequency of approximately 200 Hz to boost low frequencies to widen a perceived sound image.

Regarding Claim 39, Cohen further discloses perspective curve (Figure 2) showing a minimum gain at point B of 2.1 KHz (i.e. approximately 2 KHz) (Column 5, lines 53-55).

18. Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen as applied to claim 40 above in view of Cowieson et al. (US Patent 6,198,826). Cohen discloses a system as stated above apropos of claim 43 but does not disclose the spectral weighting filter comprising of a linear filter. Cowieson et al. discloses a surround synthesis system utilizing linear filters (Column 5, lines 13-16). It would have also been obvious to one of ordinary skill in the art at the time the invention was made that a linear filter could have been used.

19. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen as applied to claim 36 above in view of Cowieson et al. (US Patent 6,198,826). Cohen discloses a system as stated above apropos of claim 36 but does not disclose the spectral weighting filter comprising of a linear filter. Cowieson et al. discloses a surround synthesis system utilizing linear filters (Column 5, lines 13-16). It would have

also been obvious to one of ordinary skill in the art at the time the invention was made that a linear filter could have been used.

20. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen as applied to claim 35 above in view of Fosgate (US Patent 5,199,075). Cohen discloses a sound system as stated in claim 35 but does not disclose being used in a surround left or right speaker comprising of a back left and right speaker. Fosgate discloses a surround system (Figure 1) comprising surround left speaker 14 and surround right speaker 15 which include back left speaker 14b and back right speaker 15b. Fosgate teaches that a system intended for surround sound tracks is intended to have loudspeakers having dipole radiation characteristics to diffuse sound effects the rear of the room (Column 2, lines 11-19). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include surround speakers with side and rear signals to diffuse sound effects to the back of the room for a higher fidelity signal.

21. Claims 46-51, and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen (US Patent 4,308,426) in view of Fosgate (US Patent 5,199,075).

Regarding Claim 46, Cohen discloses a sound reproduction system (Figure 2) comprising: a left speaker (speaker 52) and a right speaker (speaker 54) located in close proximity; a left channel audio signal electrically connected to said left speaker (reference 56); a right channel audio signal electrically connected to said right speaker

(reference 58); and a sound processor (Figure 3) receiving as inputs said left channel audio signal and said right channel audio signal, said sound processor configured to generate a difference signal representing a difference between said left channel audio signal and said right channel audio signal (subtractor 90), apply a spectral weighting to said difference signal thereby generating a spectrally weighted signal (filters 92, 94, and 98), and cross-cancel said spectrally weighted signal with said left channel audio signal and said right channel audio signal (mixers 114, and 116), thereby generating a first and second speaker signal (output of mixers 114, and 116) for pair of speakers (left output and right output). Cohen does not disclose the system being a surround sound system with the signals and speakers being used for surround sound. Fosgate discloses a sound system with surround sound speakers (14 and 15) to give an impression of spatially surrounding the listener and broadening the sound field to wrap around the listener (Column 1, lines 15-23). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the system as disclosed by Fosgate to give an impression of spatially surrounding the listener and to broaden the sound field resulting in a higher fidelity audio sound for the listener.

Regarding Claim 47, Fosgate further discloses pair of surround speakers comprises a surround left back speaker (speaker 14b) and a surround right back speaker (speaker 15b).

Regarding Claim 48, Fosgate further discloses pair of surround back speakers located in a single speaker enclosure (Figure 2, speaker 16).

Regarding Claim 49, Fosgate further discloses a left speaker (Figure 2, speaker 11), a right speaker (speaker 13), and a center speaker (speaker 12).

Regarding Claim 50, Fosgate further discloses a first adaptive decorrelation circuit interposed between said surround left channel audio signal and said surround left speaker (phase shifter 24) and a second adaptive decorrelation circuit interposed between said surround right channel audio signal and said surround right speaker (phase shifter 25).

Regarding Claim 51, Cohen further discloses low pass filter 94 (Figure 3) which inherently consists of a first region of level gain (i.e. pass band), a second filter region having a generally decreasing gain (i.e. transition band), and a third filter region of relatively level gain (i.e. rejection band).

Regarding Claim 57, Fosgate further discloses surround left speaker and said surround right speaker are dipole speakers (Column 3, lines 55-63).

22. Claims 52 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen as applied to claim 51 above in view of Klayman (US Patent 5,661,808).

Regarding Claim 52, Cohen discloses a system as stated above apropos of claim 51 but does not disclose the spectral weighting filter with a roll-frequency of approximately 200Hz. Klayman discloses a stereo enhancement system (Figure 1) comprising a low pass filter 44. Cohen further discloses perspective curve (Figure 2) which shows a decrease at frequencies above 125Hz (i.e. approximately 200Hz) (Column 5, lines 50-51) and states it is possible to use a band-rejection filter having a

minimum gain at point B (Column 5, lines 61-63). Cohen teaches that boosting the level of difference between left and right signals can widen a perceived sound image.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a roll off frequency of approximately 200 Hz to boost low frequencies to widen a perceived sound image.

Regarding Claim 53, Cohen further discloses perspective curve (Figure 2) showing a minimum gain at point B of 2.1 KHz (i.e. approximately 2 KHz) (Column 5, lines 53-55).

23. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen as applied to claim 46 above in view of Cowieson et al. (US Patent 6,198,826). Cohen discloses a system as stated above apropos of claim 46 but does not disclose the sound processor comprising of a linear filter. Cowieson et al. discloses a surround synthesis system utilizing linear filters (Column 5, lines 13-16). It would have also been obvious to one of ordinary skill in the art at the time the invention was made that a linear filter could have been used.

24. Claim 58 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen (US Patent 4,308,423) in view of Holman (US Patent 5,043,970). Cohen discloses a sound processor (Figure 2) receiving a left channel audio signal (signal 56) and a right channel audio signal (signal 58), said sound processor configured to mix opposite-polarity (phase splitter 66 inverts signal (i.e. opposite polarity) (Column 4, lines 62-65),

spectrally-weighted cross-cancellation signals (output signal of filter 98) with the left channel audio signal and the right channel audio signal prior to applying the left channel audio signal and the right channel audio signal to the left and right speakers (output of mixer 114 and 116), thereby enlarging an apparent sound image generated by the left and right speakers. Cohen does not disclose the left and right speaker positioned within a distance corresponding to a wavelength of a highest frequency intended to be radiated. Holman discloses it is common practice to align sound systems based on frequency response (i.e. dependent on the highest frequency radiated) (Column 1, lines 57-61). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the common practiced method of aligning the sound system based on the frequency response of the speakers.

Allowable Subject Matter

25. Claims 8-10, 18, 19, 30, 42, 54, and 55 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

26. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Jyosako (US Patent 5,657,391) discloses a sound image enhancement apparatus subtracting right and left signals with spectral enhancement.

Hulsebus (US Patent 5,677,957) discloses audio circuit for enhanced ambience including subtracting right and left signals with spectral enhancement which includes response shown in Figure 3.

27. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Justin Michalski whose telephone number is (703)305-5598. The examiner can normally be reached on 8 Hours, 5 day/week.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Isen can be reached on (703)305-4386. The fax phone number for the organization where this application or proceeding is assigned is (703)872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-3900.

JIM


XU MEI
PRIMARY EXAMINER